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State of Utah
DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining
JOHN R. BAZA
Division Director

October 19, 2016

John Byars, General Manager
Canyon Fuel Company, LLC
597 South SR24
Salina, Utah 84654

Subject: Waste Rock Site Compaction Specification, Canyon Fuel Company, Sufco Mine, C/041/0002, Task ID #5281

Dear Mr. Byars:

The Division has reviewed your application. The Division has identified deficiencies that must be addressed before final approval can be granted. The deficiencies are listed as an attachment to this letter.

The deficiencies authors are identified so that your staff can communicate directly with that individual should questions arise. The plans as submitted are denied. Please resubmit the entire application.

If you have any questions, please call me at (801) 538-5325.

Sincerely,

Daron R. Haddock
Coal Program Manager

DRH/sqs
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Technical Analysis and Findings

Utah Coal Regulatory Program

October 19, 2016

PID: C0410002
TaskID: 5281
Mine Name: SUFCO MINE
Title: WASTE ROCK SITE COMPACTION SPECIFICATION

Operation Plan

Spoil Waste Coal Mine Waste

Analysis:

The application does not meet the minimum standards or R645-301-528.320 and R645-301-536 by removing the compaction specification of 95% of proctor in Volume 3,Chapter 5 Section 531, missing detailed site specific compaction specifications, missing QA/QC documentation for compaction compliance inspections, missing justification for end dump placement of waste, and not updating Chapter 5 Section 536 (page 5-21).

In September of 2015, the Utah Division of Oil, Gas, & Mining approved an expansion to the existing waste rock site, Task 4982. At that time the MRP included expanding the compaction specifications to include the material to be compacted to 95% of maximum proctor test. To maintain quality assurance a nuclear gauge was used to verify the compaction every 5,000 square yards per lift. The amendment seeks to establish a more site specific compaction measurement due to the lack of technical equipment on site, such as a nuclear gauge.

The MRP currently contains narrative explaining the construction, modification, use, maintenance of the proposed Coal Waste Rock Disposal keying into the existing Waste Rock pile specifically:
• Maps 2A through 2E show the topsoil/subsoil pile size as it will exist within the maximum disturbance at any given point of each phase to match the volumes shown in the tables on the top left of each corresponding map.
• The application shows the proposed operational map tying into existing contours on all sides.
• Map 4A through 5E show the approximate footprint area of each phase of the waste rock pile construction.

Chapter 5 Section 528 includes narrative explaining the basic cycle of how the waste will be conveyed to the site of the Coal Waste Rock Disposal. The general plans and construction of the proposed waste rock pile are detailed in Chapter 5 Section 530. The text describes how the waste rock pile site will have the foundation area prepared, stages of construction of the sequential phases 1 through 6 in the proposed waste rock areas and how the previous phase's area will be contemporaneously reclaimed.

The amendment incorrectly included removing the density specification of 95% proctor for a standard of compaction. Text was added detailing the method of compaction by a D6 dozer but the narrative must also include a compaction standard to be maintained. The intent of the geotechnical report was to describe a new standard of compaction compared to the 95% proctor with nuclear gauge testing and the MRP must include relevant information from the geotechnical report to replace the narrative removed in Chapter 5.

A geotechnical firm, Gerhart Cole, was retained to create a test lift and determine the appropriate level of passes by the on-site equipment to achieve a site specific compaction level that would achieve the assumed properties in the Earth fax

2015 slope stability analysis. The full geotechnical analysis and report is contained in the new appendix VIII. Page 3 of the geotechnical report details that the coal mine waste was, "hauled by truck directly from the mine and end-dumped into stockpiles", however, per R645-301-528.320 the Permittee is prohibited to place coal mine waste by end or side dumping. The intent behind this regulation is that lift thickness is not to exceed two feet and end-dumping statistically results in lifts beyond two feet. The Permittee must add clarifying text with Chapter 5 Section 528 and 531 making specific reference to methods employed by the Mine to ensure no lift thickness beyond two feet.

The geotechnical report completed a thorough analysis of the waste rock site by compiling samples from the mine and the existing waste rock pile. The information regarding the location of the waste rock samples tested is detailed in Table 2 of the report. The table shows that a reasonable effort was undertaken to collect a representative sample of the variations in the waste rock. The specific gravity and density of the sampled waste rock ranged from 1.37 to 2.80 and bulk density ranging from 2185 to 596 kg/m3. The specific gravity and bulk density of the waste rock was not analyzed in detail in the previous geotechnical report by EarthFax, but matches expected results based on field observations. The report also analyzed the angle of repose with the test pit construction to show that the results of the compaction test did not nullify the assumptions made in the previous EarthFax slide analysis. Earth fax utilized an angle of repose of 33.6 degrees within the slide analysis given the large aggregate of particles in the waste rock. The new geotechnical report conducted an field measurement of angle of repose and summarized the information in Table 1 and documented it Photos 11 through 18. The results of the field test showed an angle of repose ranging from 35 to 38 degrees, showing that the previous assumption of 33.6 degrees is reasonable conservative. The gradation of the waste rock samples is summarized in Table 3 of the geotechnical report and shows an overall GW identification. These findings match the previous soil characteristics determined by EarthFax geotechnical report and are the data that was utilized as inputs within the slide analysis in Appendix II (A). The data within Table 3 is displayed graphically on Figure 19 for each of the waste rock samples. The report also includes gradation limits that the new method of compaction is limited to in Table 4. These limits are also displayed on Figure 19 as the grayed area. These parameters set the thresholds of the applicability of the test piles and are summarized on Figure 19 and Table 4. This information should be clearly presented within the MRP as the figure and table are the new site specific standard of compaction.

The geotechnical report provided data to support the need for an alternative method of compaction control. Figure 8 of the geotechnical report shows the dry density readings varied between locations and number of passes. The sporadic range of the density results shows the limitations of the nuclear densometer testing and why the proposed site specific standard of compaction will result in reasonable quality control.

The geotechnical report also provided an analysis of the lift heights vs the number of passes in Figure 9. This figure shows that although the method of placement includes end dumping the lifts after initial placement are typical 2 feet in thickness. The graph also shows the reasonable compaction, 69 to 76 pcf, can be achieved after six to ten passes. The table clearly shows diminishing return on compaction beyond ten passes. The report summarized that with six passes of the dozer and staggered haul truck traffic patterns would achieve the required compaction density of approximately 75 pcf.

The geotechnical report contains sufficient detail regarding the field results including picture documentation but Chapter 5 narrative must be amend to clarify the conclusion of the report within the MRP and provide some level of documentation of compaction. The narrative within Chapter 5 section 531 and 536 need to be amended to include the haul truck staggered travel paths and including the gradation limit chart. Section 536 should include the summary of the waste placement as well under the construction criteria on page 5-21. The narrative must explicitly contain the gradation limits displayed on Figure 19 or Table 2 and detail that the quarter gradation analysis is delivered to the Division with the Quarterly waste rock inspection reports. The Permittee will also address a commitment to show some level of documentation that would be available to the site inspector to show that staggered haul pattern was utilized and a minimum of six passes was completed for any given area of the site. For example, this documentation could include a PE stamped document detailing the locations of waste placement for the quarter including a statement of witnessed staggered haul pattern traffic and completion of at least six passes by a dozer.

Deficiencies Details:

R645-301-512.230, R645-301-514.230, R645-301-521.100: The Permittee will provide qualifying narrative in Chapter 5 Section 528 and 531 detailing justification for end dumping methods employed at the site. The Permittee needs to include the full list of recommendations within Chapter 5 Section 531 and 536 including staggered haul pattern traffic and gradation limitations. The Permittee must also propose some level of documentation of haul pattern and dozer compaction to be available to the Division for inspection purposes.

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Reclamation Plan

Bonding and Insurance General

Analysis:

The application meets the minimum requirements of R645-301-800 as the applicant is current on the bond and insurance standings. The application includes an updated earthwork and revegetation cost sheet to account for additional grading and seeding required at final reclamation of the Waste Rock site. The earthwork and revegetation cost sheets include Phase 1 through Phase 3 of the waste rock site for an additional 43,895 cubic yards required. The revegetation sheet for ripping, seeding, mulching and tackifer also reflect the total disturbance acres up to Phase 3 of the waste rock site of 23.733 acres.

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